

Claims

- [c1] 1. A flip-chip gold bump structure formed on a wafer, comprising:
 - at least one gold bump;
 - a nickel layer on the gold bump; and
 - a copper layer on the nickel layer.
- [c2] 2. The flip-chip gold bump structure of claim 1, wherein the nickel layer has a thickness about from 0.1 μm to about 20 μm .
- [c3] 3. The flip-chip gold bump structure of claim 1, wherein the copper layer has a thickness about from 0.1 μm to about 10 μm .
- [c4] 4. The flip-chip gold bump structure of claim 1, wherein the gold bump has a height about from 3 μm to about 150 μm .
- [c5] 5. A flip-chip package structure adapted to connect a chip and a chip substrate, comprising:
 - at least one gold bump on the chip;
 - a nickel layer on the gold bump; and
 - a solder containing copper on the nickel layer for connecting the chip and the chip substrate.

- [c6] 6. The flip-chip package structure of claim 5, wherein the solder containing copper includes a solder alloy.
- [c7] 7. The flip-chip package structure of claim 6, wherein copper in the solder alloy is from about 0.7 wt.% to about 3.0 wt.%.
- [c8] 8. The flip-chip package structure of claim 5, wherein the nickel layer has a thickness about from 0.1 μm to about 20 μm .
- [c9] 9. The flip-chip package structure of claim 5, wherein the gold bump has a height about from 3 μm to about 150 μm .
- [c10] 10. A method of fabricating a flip-chip gold bump structure formed on a wafer, comprising:
 - forming at least one gold bump on the wafer;
 - forming a nickel layer on the gold bump; and
 - forming a copper layer on the nickel layer.
- [c11] 11. The method of fabricating a flip-chip gold bump structure of claim 10, wherein the step of forming the gold bump includes electroplating.
- [c12] 12. The method of fabricating a flip-chip gold bump structure of claim 10, wherein the step of forming the gold bump includes electroless plating.

- [c13] 13. The method of fabricating a flip-chip gold bump structure of claim 10, wherein the step of forming the nickel layer on the gold bump includes electroplating.
- [c14] 14. The method of fabricating a flip-chip gold bump structure of claim 10, wherein the step of forming the nickel layer on the gold bump includes electroless plating.
- [c15] 15. The method of fabricating a flip-chip gold bump structure of claim 10, wherein the step of forming the copper layer on the nickel layer includes electroplating.
- [c16] 16. The method of fabricating a flip-chip gold bump structure of claim 10, wherein the step of forming the copper layer on the nickel layer includes electroless plating.
- [c17] 17. A method of fabricating a flip-chip package adapted to connect a chip and a chip substrate, comprising:
 - forming at least one gold bump on a wafer;
 - forming a nickel layer on the gold bump;
 - sawing the wafer;
 - forming a solder containing copper on the chip substrate; and
 - aligning the gold bump to the solder containing copper.

- [c18] 18. The method of fabricating a flip-chip package of claim 17, wherein the step of forming the gold bump on the wafer includes electroplating.
- [c19] 19. The method of fabricating a flip-chip package of claim 17, wherein the step of forming the gold bump on the wafer includes electroless plating.
- [c20] 20. The method of fabricating a flip-chip gold bump structure of claim 17, wherein the step of forming the nickel layer on the gold bump includes electroplating.
- [c21] 21. The method of fabricating a flip-chip gold bump structure of claim 17, wherein the step of forming the nickel layer on the gold bump includes electroless plating.
- [c22] 22. The method of fabricating a flip-chip gold bump structure of claim 17, further comprising a reflow process after aligning the gold bump to the solder containing copper.